

ABSTRACT OF DISCLOSURE:

Disclosed is a neutral beam processing apparatus and method using a neutral beam having an enlarged  
5 diameter and an increased capacity while suppressing divergence of the neutral beam, removing surely the charged particles, and reducing variations in energy. An ion beam led from a plasma production cell is neutralized in a neutralization cell and is converted  
10 to a neutral beam, and an object to be processed in a process cell is irradiated with the neutral beam. In this case, as charged particle separating means for separating charged particles from the neutral beam, a multi-aperture electrode and a permanent magnet line  
15 are disposed. The permanent magnet line is set at the same potential as that of a neutralization cell wall. The multi-aperture electrode is set at a positive potential. By an interaction between an electron cyclotron magnetic field generated by the permanent  
20 magnet line and a microwave introduced from a waveguide, a plasma is generated in the neutralization cell and a flat space potential is generated in the neutralization cell. A neutral beam obtained by converting the ion beam in the flat space potential  
25 does not diverge so much, variations in energy are

reduced, and the larger diameter and larger capacity of the neutral beam can be therefore realized.